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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/776,472 | 02/11/2004 | Daniel James Branagan | NANO004U | 4067 |

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GROSSMAN, TUCKER, PERREAULT & PFLEGER, PLLC
55 SOUTH COMMERICAL STREET
MANCHESTER, NH 03101

| EXAMINER | |
|---|---|
| ZHENG, LOIS L | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1742 | |

DATE MAILED: 07/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/776,472 | BRANAGAN, DANIEL JAMES | |
| | Examiner | Art Unit | |
| | Lois Zheng | 1742 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *25 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *6,7 and 9-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6,7 and 9-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2 May 2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Status of Claims*

1. Claims 6-7 and 11 are amended in view of the amendment filed on 25 April 2005. Claim 8 is canceled. New claim 12 is added in view of the amendment. Therefore, claims 6-7 and 9-12 are currently under examination.

### *Status of Previous Rejections*

2. The rejection of claims 6-10 under 35 U.S.C. 102(b) as being anticipated by Kung US 6,302,975(Kung) is withdrawn in view of the amendment filed on 25 April 2005.

The rejection of claim 11 under 35 U.S.C. 103(a) as being unpatentable over Kung is withdrawn in view of the amendment.

The rejection of claims 6-8 under 35 U.S.C. 102(b) as being anticipated by Branagan et al. US 6,258,185(Branagan) is withdrawn in view of the amendment.

The rejection of claim 11 under 35 U.S.C. 103(a) as being unpatentable over Branagan is withdrawn in view of the amendment.

The rejection of claims 9-10 under 35 U.S.C. 103(a) as being unpatentable over Branagan in view of Kung is withdrawn in view of the amendment.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 6-7, 9-10 and 12 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. "...a metal surface that is substantially clean of said oxidized metal surface layer..." as recited in the independent claim 6 is not supported by the original specification. Page 6 lines 3-6 of the specification only supports a metal surface that is relatively clean of the oxidized surface layer.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 6-7 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Branagan in view of the Kushner et al. US 4,361,604(Kushner).

As stated in the previous Non-Final Office Action, Branagan discloses a method of forming a steel(abstract). Branagan teaches, in one of the embodiments, that metallic iron based alloy of $Fe_{64}Ti_3Cr_5Mo_2B_{16}C_5Si_1Al_2Gd_2$ (Table 1) is plasma sprayed onto the surface of a steel drum to form a coating layer(col. 6 lines 15-18). Branagan further teaches, in one of the embodiments, that a metallic molten alloy of $Fe_{68}Cr_4Mo_7P_{12}B_6C_3$ is sprayed onto a metallic substrate to form a coating layer(col. 7 lines 15-18).

With respect to amended claim 6 of the instant invention, Branagan teaches the iron based metallic coating alloy as claimed. The Ti and Cr in the iron based alloys of Branagan read on the claimed deoxidizing elements as recited in instant claim 6. The B, C, P and Si in the iron based alloys of Branagan read on the claimed oxygen seeking nonmetal/metalloid as claimed. Based on Branagan's alloy composition, the amount of deoxidizing element and nonmetal/metalloid present falls within the claimed 20%-70% of the iron based coating alloy as claimed. Branagan also teaches the claimed application of iron based alloy melt to a metal surface.

However, Branagan does not explicitly teach applying the iron based coating alloy melt to removed the oxidized surface layer on the metal substrate.

Kushner teaches coating of metal substrate with a flame spray material in order to protect the metal substrates(col. 1 lines 14-22). Kushner further teaches cleaning the substrate before coating the metal substrate in order to improve the adherence of the coating layer(col. 1 lines 23-27)

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated a cleaning step as taught by Kushner into the coating process of Branagan in order to improve the adherence of the coating layer as taught by Kushner.

In addition, since Branagan teaches that the iron based coating melt comprises deoxidizing elements such as Ti and Cr, it would have been obvious to one of ordinary skill in the art to have applied the iron based coating melt of Branagan in the cleaning step of Branagan in view of Kushner in order to remove any native oxide layer that might have developed over time.

Furthermore, since Branagan in view of Kushner teach using the same iron based coating alloy as claimed in a coating process that is substantially similar to that of the instant invention, one of ordinary skill in the art would have expected that the coating process of Branagan in view of Kushner to produce an iron based metallic coating layer with the same bond strength(i.e. at least about 5500 psi) as claimed.

With respect to claim 7 of the instant invention, since Branagan in view of Kushner do not teach the presence of precipitates in the molten coating alloy, the examiner construes that the precipitates is not present in the molten coating alloy based on the broadest interpretation.

With respect to instant claim 9-10, the plasma spraying technique of Branagan in view of Kushner reads on the claimed thermal spraying technique as recited in instant claims 9-10.

With respect to instant claim 11, the claimed reducing of oxidized surface layer and forming of metallurgical bond inherently take place in the process of Branagan in view of Kushner since applying iron based alloy in the cleaning step inherently reduces the oxidized surface layer and applying the iron based coating alloy melt to the cleaned metal surface via plasma spraying inherently forms the metallurgical bond as claimed.

With respect to claim 12 of the instant invention, the B, C, P and Si in the iron based alloys of Branagan in view of Kushner read on the claimed oxygen seeking nonmetal/metalloid as claimed.

7. Claims 6-7 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kammer et al. US 4,348,433(Kammer).

Kammer teaches flame-spray coating metal substrate with a iron based alloy material forming a coating with bond strength of about 2500psi and above(col. 1 lines 14-21, col. 2 lines 41-52, col. 4 lines 32-40, col. 7 lines 18-23).

With respect to instant claim 6, Kammer also teaches the claimed deoxidizing element such as 5-35% of Cr and the claimed oxygen seeking nonmetal/metalloid such as 0-5% Si, 0-5% B and 0-5% C(col. 4 lines 57-65). The amount of deoxidizing element and nonmetal/metalloid present falls within the claimed 20%-70% of the iron based coating alloy as claimed. The claimed melting of iron based coating alloy is inherently present since flame spaying technique inherently melts the coating alloy.

Even though Kammer does not explicitly teach applying the iron based coating alloy melt to removed the oxidized surface layer on the metal substrate, Kammer does teach cleaning the substrate before coating the metal substrate in order to improve the adherence of the coating layer(col. 1 lines 22-26). Since Kammer teaches that the iron based coating melt comprises deoxidizing elements such as Cr, it would have been obvious to one of ordinary skill in the art to have applied the iron based coating melt in the cleaning step of in order to improve coating adhesion and to remove any native oxide layer that might have developed over time.

Furthermore, the bond strength as taught by Kammer(i.e. about 2500psi and above) encompasses the claimed bond strength of at least about 5500psi. Therefore, a prima facie case of obviousness exists. See MPEP 2144.05. The selection of claimed bond strength range from the disclosed range of Kammer would have been obvious to

one skilled in the art since Kammer teaches the same utilities in its' disclosed bond strength range.

With respect to claim 7 of the instant invention, since Kammer does not teach the presence of precipitates in the molten coating alloy, the examiner construes that the precipitates is not present in the molten coating alloy based on the broadest interpretation.

With respect to instant claim 9-10, the flame spraying technique as taught by kammer reads on the claimed thermal spraying technique as recited in instant claims 9-10.

With respect to instant claim 11, the claimed reducing of oxidized surface layer and forming of metallurgical bond inherently take place in the process of Kammer since applying iron based alloy in the cleaning step inherently reduces the oxidized surface layer and applying the iron based coating alloy melt to the cleaned metal surface via flame spraying inherently forms the metallurgical bond as claimed.

With respect to claim 12 of the instant invention, the B, C and Si in the iron based alloys of Kammer read on the claimed oxygen seeking nonmetal/metalloid as claimed.

***Response to Arguments***

8. Applicant's arguments filed 25 April 2005 have been fully considered but they are not persuasive.

In the remarks, applicant argues that Branagan reference does not teach applying an iron based metallic coating alloy to a metal surface that is substantially clean of an oxidized metal surface layer and Branagan does not teach the claimed bond

strength of at least about 5500psi. These arguments are moot in view of the new grounds of rejection as stated in paragraph 6 above.

With respect to applicant's argument that disclosure of a Fe/Cr/Mo/P/B/C type alloy does not teach or suggest the claimed iron based metallic coating alloy, the examiner does not find the arguments persuasive since Branagan clearly teaches the claimed deoxidizing elements and oxygen seeking nonmetal/metalloid in the claimed amounts. See paragraph 6 above.

With respect to applicant's argument of remarkable bond strength as a result of the coating process of the instant invention, the examiner does not find the argument persuasive since MPEP 716.02 requires that any allegations of unexpected results must be accompanied by factual evidence in declaration form. Therefore, applicant's argument of remarkable bond strength is considered as conclusive statement only.

With respect to applicant's argument that Branagan's lack of teaching the presence of precipitation does not support the rejection under 35 U.S. C. 102 or 103, the examiner does not find the argument persuasive. Branagan teaches using the same iron based metal alloy and same type of thermal spray coating. However, Branagan does not mention the presence of precipitation. Therefore, the examiner reasonably concludes that the precipitation must not have been present.

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lois Zheng whose telephone number is (571) 272-1248. The examiner can normally be reached on 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LLZ

ROY KING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700